

CLAIMS

1. A nitride semiconductor device comprising a GaN substrate having a single-crystal GaN layer at least on its surface and plurality of device-forming layers made of nitride semiconductor and formed on said GaN substrate, wherein a compressive strain is applied to said device-forming layer which is contacting said GaN substrate.

2. The nitride semiconductor device according to claim 1, wherein said device-forming layer contacting said GaN substrate has a coefficient of thermal expansion smaller than that of GaN.

3. The nitride semiconductor device according to claim 1, wherein said device-forming layer contacting said GaN substrate is made of $\text{Al}_a\text{Ga}_{1-a}\text{N}$, ($0 < a \leq 1$).

4. The nitride semiconductor device according to claim 3, wherein said device-forming layers include an n-type cladding layer containing Al, an active layer containing InGaN and a p-type cladding layer containing Al.

5. The nitride semiconductor device according to claim 4, wherein said device-forming layer made of $\text{Al}_a\text{Ga}_{1-a}\text{N}$ functions as an n-type contact layer.

6. The nitride semiconductor device according to claim 1, wherein said single-crystal GaN layer is formed through lateral-growth process.

7. A method of manufacturing a nitride semiconductor device, which includes a GaN substrate having a single-crystal GaN layer at least on its surface and plurality of device-forming layers made of nitride semiconductor formed on said GaN layer, comprising the steps of;

forming a first nitride semiconductor layer on a auxiliary substrate made of different material from nitride semiconductor;

forming a stripe-shaped or island-shaped periodical concave-convex structure

on said first nitride semiconductor layer;

forming a single-crystal GaN layer to make a GaN substrate; and

forming a second nitride semiconductor layer on said GaN substrate, the second nitride semiconductor layer having a coefficient of thermal expansion smaller
5 than that of GaN.

8. The method of manufacturing a nitride semiconductor device according to claim 7, wherein said auxiliary substrate is removed after forming said single-crystal GaN layer to make GaN substrate.

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